AMERICAN FARMER.

RURAL ECONOMY, INTERNAL IMPROVEMENTS, PRICE CURRENT.

" *O fortunatos nimium sua si bona norint*
" *Agricolas*" . . . . . VIRG

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AGRICULTURE.

Extract from Darwin's Phytologia

Economy of Vegetation.

THE GROWTH OF SEEDS, BUDS, AND BULBS.

(Continued.)

II. 1. Buds are viviparous progeny. *Protected by scales and varnish. Grow by piping with more heat and moisture as they exhale less. Are individual, annual, or biennial plants* 2. *Buds of herbs Evergreens have no bleeding season* 3. *Buds of deciduous trees are in different states of maturity, as in hepatica daphne, osmunda Some buds are invisible.* 4. *Importance of the pith like the spinal marrow; it lines hollow stalks.* 5. *Reservoir of nutriment for buds. Their umbilical vessels.* 6. *A bud contains many embryons — The first leaf buds often destroyed by insects. The flower-buds only injured by them.* 7. *Vigorous branches produce leaf buds, weak ones flower-buds Why seedling apples are long before they bear. Why pears bear only at their extremities.* 8 *New buds may be made either leaf-buds by topping a part of the branch, or flower-buds by bending the branch down, or cutting a ring in the bark, or strangulating it with a wire. Debarked oaks put lulate. Sap juice in the alburnum.* 9 *A pause in vegetation about midsummer. Trees then secrete nutriment in their roots and sapwood for the new buds. Are then best transplanted without lopping their branches.* 10. *Caudexes of the buds from the bark, whose vessel inosculate. Heart-wood dies. Sapwood acts as umbilical vessels, and afterwards as capillary tubes, or as capillary syphons.* — 11 *Flower buds perish without increasing the bark by new caudexes. Are convertible into leaf-buds. Vegetable monsters.* 12. *Central part of an adult bud.*

II. 1. Other vegetable embryons are produced in the buds on the stems or branches of trees, which may be termed the viviparous progeny of plants, in contradistinction to those from seeds, which may be termed their oviparous progeny. These buds are either leaf-buds or flower-buds, or both in one covering; the bud is termed hybernaculum or winter-cradle, of the embryon shoot, and is covered with scales, and often with a resinous varnish, as in tacamahacca, to protect it from the cold and moisture of the ensuing winter, and from the depredation of insects.

These by inoculation or ingrafting on other stems of trees, or by being planted in the earth, become plants exactly similar to their parents. A small glass inverted over these buds, when set in the earth, contributes to insure their growth by preventing too great an exhalation, otherwise they are liable to perspire more than they can absorb, before they have acquired roots: this the gardeners call piping a slip, or a cutting, of a plant. In this situation a greater heat may be given them, as in hot houses, without increasing the quantity of perspiration, which ceases as soon as the air in the glass is saturated with moisture; and the increase of heat much contributes to the protrusion of their roots and new buds, as they can at the same time bear to be supplied with a greater quantity of moisture.

Every bud of most of the deciduous trees of this climate may therefore be considered as an individual biennial plant, as distinctly so as a seed: that is, the bud like a seed is formed in one summer, grows to maturity in the next, and then dies. In some trees nevertheless of this climate, as the mock orange, philadelphus, acacia, viburnum; and in the evergreen shrubs or trees, as holly, laurel, vinca, heath and rue; and in all those herbs commonly called annuals; and in the most of the trees of warmer climates; the buds appear to be formed in the vernal months, and to arrive at their maturity during the same year; and may therefore properly be called annual plants

2 The bud of these herbs, which are commonly called annuals, rises in the bosom of a leaf: and, as it adheres to its parent, requires no female apparatus to nourish it, but gradually strikes down roots from its caudex into the ground, which caudex forms a part of the bark of the increasing plant. This occurs in those herbaceous vegetables, which have just risen from seeds: the buds of which are properly individual annual plants, which grow to maturity adhering to the parent, and do not therefore resemble a seed or egg, as there is no reservoir of nutriment laid up for them.

This circumstance also happens, I suppose, to the evergreen shrubs and trees of this climate, as to heath, rue, box, pine, laurel; for in these vegetables, as the leaf does not die in the autumn, it continues to oxygenate the blood, and to supply nourishment to the bud in its bosom during the fine days of winter, and in the spring, and survives till near midsummer; that is, till the new bud has expanded a leaf of its own. Whence I suppose these evergreens lay up in summer no store of nutriment in their roots or alburnum for the sustenance of their ensuing vernal buds; and have thence probably no bleeding season like deciduous trees.

But the embryon is a bud of a deciduous plant, leaves in the spring of the year its winter cradle, or hybernaculum, like the embryon in a seed, or a chick in the egg; and like these the young plants of different vegetables have previously arrived at different states of maturity. Thus Mr. Ferber asserts, that he was delighted in observing in the buds of hepatica, and pedicularis hirsuta, yet lying in the earth, and in the gems of the shrub daphne mezereon, and at the base of osmunda lunaria a perfect plant of the future year discernible in all its parts; thus also in horse-chesnut the leaves, and in cornel tree the flowers, are each distinctly visible during the winter in their respective buds. Amœn. Acad. Vol VI. No. CXX. Milne's Dict. Art. Gemma.

While in buds of many other trees, and probably in all the more backward buds, which are formed late in the summer on the lower parts of branches, and much deprived of light and air, the embryon is not so forward as to be easily discernible; and in those shrubs or trees, which are deciduous in this climate, and yet have no apparent buds in the winter, as the philadelphus or mock orange, viburnum, and many shrubs I suspect there is nevertheless an embryon secreted from the blood at the foot-stalk of each leaf, though it is not so forward as to protrude through the bark, and produce a prominent bud, or hybernaculum. The same I suspect to occur in respect to trees, which lose their leaves in winter, in warmer climates, in which they are said not to produce autumnal buds; as I cannot conceive by what means fresh leaf-buds can be generated in the spring, when the leaves, which constitute the lungs of the mature living part of the tree, are dead; and the whole of that mature living part, or last year's bud, consequently dead along with them. But if the caudex of the new bud be generated without the plumula, or visible bud, it can certainly produce a plumula for itself in the ensuing spring, as is seen by the production of new buds, when a branch is cut off, round the remaining trunk, as is done frequently to the stems of willows.

In similar manner the viviparous offspring of different animals arrive at different states of perfection before they are born, as calves and foals can stand erect in an hour, and quickly learn to use their eyes, and to run after their mothers; while the blind puppy, and kitten, and the downless rabbit, are long before they leave the nest which the parent has provided for them.

4. The presence of the pith or medulla is of great importance to the growth of the new bud, as may be observed by gradually slicing a shoot of a horse-chesnut in the autumn, or in the early spring. The rudiments of the seven separate ribs of the late parent-leaf, and the central pith of the bud in its bosom, are seen to arise or terminate near the pith of the parent shoot, where the embryon plumula is previously secreted by a gland at the bottom of the parent leaf-stalk, finds there its first reception and nourishment, and is gradually protruded and elongated by the pith, which exists in its centre, as the bud proceeds, and thus constitutes the ascending caudex or uterus of the new bud; which is resembled by the wires of strawberries, and other creeping vegetables; whereas the descending caudexes of the new buds, which

form the filaments of the bark of trees, are secreted from the various parts of the old bark in their vicinity; all which probably occur at the same time by sympathy, as shewn in Sect. VII.

The pith thus appears to be the first or most essential rudiment of the new plant, like the brain or spinal marrow, medulla oblongata, which is the first visible part of the figure, I believe, of every animal fetus, from the tadpole to mankind.

In those plants which have hollow stems, this central cavity, though not filled with the pith or medulla, appears to be lined with it; as in picris and tragopogon: in the former the stem is not only lined with the pith, but wherever a new bud is generated on the summit of the ascending stem, or in the bosom of a leaf, a membranous diaphragm divides the cavity, and is covered with this medullary substance, which division thus distinguishes one bud from another: and in slicing away the part of the stem of tragopogon, where the new lateral bud adheres, the medulla or pith in the centre of the bud is seen to commence near that membrane which lines the stem, and to pass through the circle of arterial, venal, and absorbent vessels, which constitute the ascending caudex, or uterus, of the new bud, while the descending caudex of it is secreted from the various parts of the older bark in its vicinity.

Something similar to this mode of the production of the buds of trees had not escaped the ingenious Mr. Bradly, who asserts, "that buds have their first rise in the pith; they are there framed, and furnished with every part of vegetation, and forced forwards to meet the air through the tender bark, and would drop on the ground, if they were not restrained by vessels, which serve as roots to nourish them; and thus as a seed takes root in the earth, a bud takes root in the tree; but with this difference, that the seed has lobes to supply it with nourishment, till it can select juices from the earth; but the bud has no occasion for lobes, because it takes root immediately in the body of the tree, where the proper juices are already prepared for it." Discourses on the Growth of Plants, 1727, p. 56.

5. As the seed was nourished in the pericarp by an adapted secretion from the vegetable blood oxygenated in the bractes or floral-leaves; and as a reservoir of nutriment was also prepared for it afterwards in the seed-lobes and fruit; so the bud is at first nourished in the bosom of its parent leaf by an adapted secretion from the vegetable blood; and continues to be so nourished in annual herbs and evergreen trees, till it protrudes and expands its own leaf; but if it be a bud of a deciduous plant, which must lose its parent-leaf in winter, a reservoir of nutriment is prepared for it in the roots of some plants, as in carrots, turnips, liquorice, fern; and probably both in the roots and alburnum, or sap-wood, of trees.

Thus in the spring the umbilical vessels belonging to each individual biennial plant, or bud of a tree, absorb moisture from the earth, and propel it upwards through the roots and alburnum, where it is mixed with a nutritious material, and carried upwards in some trees with a power equal to the pressure of the atmosphere, as in the vine, vitis; the birch, betula; and the maple, acer, which at that season bleed at every wound, as treated of in Sect. III.

6. At this time the buds begin to swell, and to shoot roots downwards from their caudexes into the earth; the intertexture of these caudexes constitues a new bark over the old one, consisting of arteries, veins, and absorbents, as described in Sect. I. 3. Each bud then also puts forth a leaf, which is a respiratory organ, and resembles in many respects the lungs of animals, as described in Sect. IV. but differs from them in this circumstance, that the leaf requires light as well as air for the purpose of perfect respiration, as will be treated of in the Section on Light.

Each embryon of a leaf-bud is thus furnished with its respiratory organ: and as many new embryons were generated during the summer in each leaf-bud, they now pullulate in succession; each of which has like the first its appropriate leaf, which, as they successively advance, compose the annual shoots or sprigs of trees; which in some plants become of great length, as in vines, and willows, consisting of twenty or thirty new leaves. Hence if the first set of leaves be destroyed by vernal frosts, as frequently happens to ash-trees, fraxinus, and to the weeping willow, salix babylonica; or by the depredation of insects, which often injure our fruit-trees; and perpetually occurs in this climate to the spindle-tree euonymus; and in Italy to the white mulberry-tree, which has its first leaves plucked off for the food of silk-worms, and to the tea-tree in China; a second set of leaves succeeds, which belong to the second embryons of the same bud.

But when the bractes or floral-leaves are destroyed by insects, as sometimes happens to currant trees, and apple trees; the fruit in the pericarp does not perish, like the first embryon of the leaf-bud above mentioned; because it is still supplied by the absorbent system of the caudex and roots of the flower-bud, which compose a part of the bark, and pass into the ground; but the fruit becomes sour and less perfect from the want of a due oxygenation of the juices, from which it is secreted; though its glands may probably also receive some oxygenated blood by the inosculation of the vessels of different buds, whether flower-buds or leaf-buds, with each other in the bark, on supposition that they are not all of them totally destroyed.

7. In the axilla of each leaf is generally produced about midsummer either a new leaf-bud or a flower-bud; if it be a leaf-bud, it becomes a branch the next year, producing many other leaves, and many other buds; if it be a flower-bud, the growth ceases, terminating in the seed. During the greater vigour of the plant the leaf-buds are solely or principally produced, as in young healthy trees, but when the vessels of the bark become further elongated, as the plant grows taller, the nutritive juices are less copiously supplied, or the buds are become more mature, and the production of flower-buds succeeds as in Mr. Walker's experiments the sap of the birch-tree in the spring was two or three weeks later in ascending to the top of a high tree, than to the lower branches. Edinb. Transact. Vol. I.

Hence it happens, that the grafts from strong seedling apple-trees do not bear fruit, till they are twelve or twenty years old; while the grafts from old weak trees will bear copiously in two or three years, and hence very vigorous trees, as pears, produce fruit only at their extremities; but if you decorticate about an inch of a branch of a vigorous pear-tree, and thus weaken it; that branch will flower, and bear fruit at every bud like trees of less vigour.

It should be here observed, that the words strength and weakness, when applied to the growth of vegetables, are in reality metaphorical terms; or express the effect or consequence of their producing leaf-buds or flower-buds, rather than the cause of it, whereas it is the facility with which the long caudexes of the new buds, which form the new filaments of bark, can be generated, which increases the number of leaf-buds, and gives the tree a luxuriant or vigorous appearance; and the difficulty of generating these new caudexes which increases the flower-buds, and thus gives a less vigorous appearance to the tree.

The generation of buds seems to require a less perfect apparatus than the generation of seeds; as that of buds always precedes that of seeds, both in trees and herbs; and because the caterpillar is converted into a butterfly solely for the purpose of seminal propagation; whereas the polypus can only propagate laterally, or by buds. Hence the age of the plant is another necessary circumstance to the production of flowers, fruit, and seeds, as appears in tulips, and hyacinths, as well as in apple trees and pear-trees.

8. About midsummer the new buds are formed; but it is believed by some of the Linnean school, that these buds may in their early state be either converted into flower-buds or leaf-buds, according to the vigour of the vegetating branch. Thus if the upper part of a branch be cut away, the buds near the extremity of the remaining stem, having a greater proportional supply of nutriment, and possessing a greater facility of producing their new caudexes along the bark, will become leaf-buds; which might otherwise have been flower-buds; and on the contrary, if a vigorous branch of a wall-tree, which was expected to bear only leaf-buds, be bent down to the horizon or lower, it will bear flower-buds with weaker leaf-buds, as is much exemplified by Mr. Hitt in his Treatise on Fruit Trees.

The theory of this curious vegetable fact has been esteemed difficult, but receives great light from the foregoing account of the individuality of buds. Both the flower-buds and leaf-buds die in the autumn; but the leaf-buds, as they advance, produce during the summer other leaf-buds or flower-buds in the axilla of every leaf; which new buds require new caudexes extending down the bark, and thus thicken as well as elongate the branch; whereas the flower-buds shed their seed, when they perish in the autumn, and thus require no place on the bark for new caudexes. Hence when the summit of a branch is lopped off, the buds near the extremity of the remaining stem produce new leaf-

buds with greater facility, as there is more room for their new caudexes to be generated along the descending bark. But if a vigorous branch be bent down to the horizon, or below it, the bark is compressed beneath the curve, and extended above it, and thus the production of new caudexes along the bark is impeded, and in consequence less leaf-buds and more flower-buds will be generated, or the former converted into the latter; which require no new caudexes. And on this circumstance principally depends the management of wall fruit trees, and of espalliers.

For the purpose of thus converting leaf-buds into flower-buds Mr. Whitmill advised to bind some of the most vigorous shoots with strong wire, and even some of the large roots; and Mr. Warner cuts, what he calls, a wild-worm about the body of the tree; or scores the bark quite to the wood like a screw with a sharp knife. Bradley on Gardening, Vol. II. p. 155. Mr. Fitzgerald produced flowers and fruit on standards and wall-trees by cutting off a cylinder of the bark, three or four inches long, and replacing it with proper bandage, (Philos. Trans Ann. 1761) as described in Sect. XV. 1. 3. of this work. M. Busson produced the same effect by a straight bandage put round a branch, Act Paris, Ann, Ann. 1738; and concludes that an ingrafted branch bears better from its vessels being compressed by the callus produced, where the grafted scion joins the stock.

It is customary to debark oak-trees in the spring, which are intended to be felled in the ensuing autumn; because the bark comes off easier at this season, and the sap wood, or alburnum, is believed to become more durable, if the trees remain till the end of summer from their expending their saccharine sap-juice in the ensuing foilage, and thus being less liable to ferment and putrify. The trees thus stripped of their bark put forth shoots as usual with acorns on, the sixth, seventh, and eighth joint, like vines; but in the branches I examined the joints of the debarked trees were much shorter than those of other oak-trees; the acorns were more numerous; and no new buds were produced above the joints which bore acorns.—From hence it appears that the branches of debarked oak-trees produce fewer leaf-buds, and more flower buds; which must be owing to the impossibility of their producing new caudexes down the naked branches and stem for the embryon progeny of leaf-buds.

The pullulation of leaves on debarked oaks demonstrates, that the reservoirs of nutriment deposited in the preceding summer for the use of the vernal buds must be in this alburnum; and that it is this saccharine matter which induces the alburnum to ferment and rot sooner than the internal wood. Thus Dr Walker found on nice inspection the sap-juice to flow from the ligneous circles of the alburnum as well as between them, when a fresh piece was cut off from a cicatrized part, and also between the wood and the bark. Edinb. Transact. Vol. I. He also observed that oak, ash, elm, aspen, hazel, and hawthorn, do not bleed; and that the birch, plane, and maple bleed the most, and that the great willow, salix caprea, does not bleed, but the sap-juice rises visibly between the wood and the bark, so as to make the bark separate easily from the wood. From all these facts it may be inferred, that the saccharine matter, which is dissolved in the sap-juice, is deposited in the autumn in the roots of some trees, and in the alburnum of others, or in both: as manna is found in the wood of the manna-ash: and sugar in the joints of many grasses and of the sugar-cane, and in the roots of liquorice, beets, and many other herbaceous vegetables.

9. About Midsummer, after the new buds appear in the bosom of every leaf, many authors have remarked that there seems to be a kind of pause in vegetation for about a fortnight, which they have ascribed to different causes. At this time I suspect a reservoir of nourishment for the new buds is forming about the roots or in the alburnum of the tree: and that the caudexes and umbilical vessels of the new buds are also at this time forming down the bark, and terminate in these nutritious reservoirs in the roots or new alburnum like the umbilical vessels called seminal roots, which are visible in many seeds

That this system of umbilical vessels is possessed of a great power of absorption in the roots of trees is certain from the force, with which the sap-juice was propelled upward from a vine-stump in Dr. Hales' experiment. That the sap-juice thus propelled upward nourishes or expands the leaf of each new bud appears from the experiments of Dr. Walker; as the leaves began to unfold at the same height, as the wounded wood began to bleed, and that these vessels pass through or constitute the sap wood is evinced by the growth of the buds on oak-trees, after the bark is almost totally taken off.

The roots of trees are at this time protruded with greater vigour, as observed by the ingenious Mr. Bradly, who on that account prefers the midsummer for transplanting trees, if they are not to be removed to any great distance: and adds, that the new shoots in the following spring will put forth with much greater force, and the tree will thence be almost a year forwarder in its growth, than if it remains untransplanted till the winter. Discourses on Earth and Water. This seems to be owing to the destruction of much of the nutritious matter deposited in the roots for the use of the new buds, which is torn off in transplanting, and which can only be replaced about midsummer or soon after.

Mr. Bradley further adds, that when trees are thus transplanted at midsummer, no part of the top of branches, or foliage, should at that time be cut off; which well accords with the theory above delivered; as it is from the vegetable blood, which is oxygenated by its exposure to the air through the thin moist pellicle on the upper smooth surfaces of these leaves, that the nutriment for the expansion of the buds in the succeeding spring is secreted or produced; and hence if these leaves are prematurely destroyed, the vernal growth of the buds must receive injury; as the reservoir of future nutriment for them will be less in quantity; but if some of the branches are lopped during the winter, the remainder will protrude more vigorous shoots, as their share of the reserved nutriment will be greater.

10. The umbilical vessels of the new buds of deciduous trees, which are analogous to those which permeate the lobes of the seed, are extended downward in the bark about midsummer, and terminate in certain reservoirs of nutriment, which are at this time secreted from the vegetable blood oxygenated in the leaves. This bark now consists of an intertexture of the caudexes of the present leaves, which were buds in the last summer, and are now adult vegetable beings; and of the embryon caudexes of the new buds; and of the umbilical vessels of the new buds; it will become alburnum or sap-wood during the autumn or ensuing spring, and will be gradually covered over with a new bark consisting of the mature caudexes of the new buds, while that, which was the alburnum in the preceding spring, will become a circle of lifeless timber, interior to the circle of alburnum.

The vessels of this new bark, though they consist of the caudexes of the individual adult leaves, and the umbilical vessels of the individual young buds, evidently inosculate; because, when some buds are rubbed off or destroyed, those in their vicinity grow with greater vigour; as the daily experience of pruning all kinds of trees evinces. The facility with which the ruptured vessels of vegetables inosculate into each other, or grow together, corresponds with that of animal vessels in their inflamed state. Thus a bud taken from one tree, and inserted into any part of the bark of another tree of the same genus, or ingrafted on it, presently receives nutriment, and grows to it by the reciprocal inosculation of the wounded vessels, in the same manner as a transplanted tooth; or as the fingers are liable to grow together after having been excoriated by a burn; or as the inflamed lungs and pleura are liable to adhere, and intermix their blood-vessels. See Sect. III. 2. 7.

During the winter, when the leaves die and fall off, the arterial and venous systems, which belonged to them, and which composed the greatest part of the bark, seem to lose their vegetable life at the same time, and to coalesce, and form the alburnum, or sap-wood; but the umbilical vessels belonging to the new buds, which are intermixed with this alburnum, remain alive: and at the returning spring act with astonishing vigour; as described in Sect. III. 2. 2.

As the spring advances, the umbilical vessels after having drank up the reservoirs of nutriment, which were deposited about the roots, and having thus nourished and expanded the new leaves, cease to act; and the alburnum gradually changes into hard wood, called the heart of the tree; which no longer possesses vegetative life; and is now only useful to elevate and sustain aloft the swarm of biennial plants, which cover it; and was probably originally produced for this purpose in the contest of all vegetables for light and air.

This inert or lifeless state of the central parts of trees, called the heart-wood, is evident from those old oaks and willows, which have lost their internal hard wood, and are become

quite hollow, consisting only of their bark and alburnum, and yet are furnished with many healthy branches. But the umbilical vessels of the alburnum possess the properties of capillary tubes, or of a sponge, after they are extinct, and cease to act as umbilical vessels: and thus may occasionally attract moisture, or suffer it to pass through them mechanically: whilst the new bark, which consists of an intertexture of the caudexes of each bud with their radicles, may occasionally absorb this moisture from the capillary vessels of the alburnum, which may be compared to the upper stratum of the soil attracting by capillary power the moisture from the soil immediately beneath it, which may exhale into the atmosphere, or be imbibed by the roots of vegetables by the superior living power of their absorbent mouths.

That the vessels of the alburnum in their living state possess the property of conveying the sap juice, which is propelled upwards in the early spring by the absorbent terminations of the roots, is visible in decorticated oaks: the branches of which expand their buds, like those of the birch and vine in the bleeding season.—That the vessels of the alburnum in their living state occasionally act as capillary syphons, through which the sap juice is first pushed upwards by the absorbent extremities of the roots, and afterwards returns downwards partly by its gravitation in branches bent below the horizon, appears from an experiment of Dr. Walker, mentioned in Sect. III. 2. 4.

Lastly, that the vessels of the alburnum after their vegetable life is extinct, possess a power of capillary attraction to the sap-juice, or permitting it to pass through them occasionally, appears from the following experiments. First, a branch of a young apple-tree was so cankered, that the bark for about an inch quite round it was totally destroyed. To prevent the alburnum from becoming too dry by exhalation, this decayed part was covered with thick white paint; in a few days the painting was repeated, and this three or four times, so as to produce a thick coat of paint over the decayed part, or naked alburnum, extending to the ascending and descending lips of the wound; this was in spring, and the branch blossomed and ripened several apples.

In a garden in Lichfield about four years ago a complete cylinder of bark about an inch long was cut from a branch of a pear tree nailed against a wall; the circumcised part is now not more than half the diameter of the same branch above and below it; yet this branch has been full of fruit every year since, when the other branches of the tree have borne only sparingly. I lately observed, that the leaves of this wounded branch were smaller and paler, and the fruit less in size, and ripened a fortnight sooner, than on the other parts of the tree. Another branch of the same tree has a part of the bark taken off about an inch long, but not quite all round it, with much the same effect.

The existence of capillary tubes in dead sap-wood is visible in a piece of dry cane, which permit water or smoke to pass through them: and in the exhausted receiver of an air pump both water and quicksilver may be made readily to pass through pieces of the dry alburnum of wood by the pressure of the atmosphere.

11. The flower-buds of many trees arise immediately from the last year's terminated shoots, or spurs, either accompanied with leaf buds, or separately, as in apple and pear-trees. Other flower buds arise from the shoots of the present year alternately with leaf-buds, as those of vines, and form the third or fourth buds of the new shoots. They differ from leaf-buds in this circumstance, that they perish when their seeds are ripe, without producing any addition or increase to the tree; whereas when the leaf-buds perish in the autumn, their caudexes, the intertexture of which constitutes the bark of the tree, gradually become converted into alburnum, or sap-wood; over which the new leaf-buds shoot forth their caudexes and radicles, or insert them into it, and gradually fabricate the new bark and root-fibres.

It was before mentioned, that it is believed by some disciples of the Linuean school, that about midsummer leaf-buds may be changed into flower-buds or flower-buds into leaf-buds; and that even after the vegetable embryons are generated. And that this may be effected by weakening or strengthening the growth of the last year's buds, which secrete these new ones from the vegetable blood, and nourish them in their infant state. Thus if some inches of the extremity of a branch be lopped off at midsummer, as is sometimes done by unskilful gardeners, the remaining few buds will become more vigorous, and consequently produce leaf-buds instead of flower-buds; or perhaps the embryons already formed may be converted from one kind to the other. The contrary may occur, if a vigorous branch of a wall-tree be bent down beneath the horizon, or so much as to impede the generation of new caudexes; or if the leaf of the parent-bud be taken off, soon after the plumula or apex of the new bud is generated; and thus the new caudex along the bark may be prevented by deficiency of nutriment.

The probability of this idea of transmuting flower-buds into each other is confirmed by the curious conversion of the parts of the flowers of some vegetable monsters into green leaves; if they be too well nourished, after they are so far advanced as to be unchangeable into leaf buds. Thus in the plantago, rosea, rose-plantain, the divisions of the spike become wonderfully enlarged, and are converted into leaves; the chaffy scales of the calyx in xeranthenum, everlasting, and in a species of dianthus, pink, and the glume of some alpine grasses, and the scales in the ament of the salix rosea, rose willow, grow into leaves, and produce other kinds of vegetable monsters.

Add to this, that the petals of the helleborus niger, or christmas-rose, are beautifully white till the seed is impregnated; and then they change into green leaves, forming a calyx.—And lastly, in other flowers a bud or bulb succeeds the impregnation instead of a seed, as in polygonum viviparum, viviparous bistort; and in allium magicum, magical onion; the same occurs in many of the alpine grasses, and in the festuca dumetorum, fescue grass; and which are in some degree analogous to the supposed conversion of early flower-buds into leaf buds; for in these magical onions, and other bulbiferous flowers, the bractes or floral-leaves, which at first secrete nourishment for the pericarp and seeds of the plant, assume a new office, and secrete a magazine of nourishment for the new bulb, as appears in the concentric fleshy membranes, which surround the new summit-bulbs of the allium magicum, and the cloves of garlic.

12. The central part of an adult bud therefore consists first of a conjunction of the blood-vessels from above and below, which exists in the caudex of the bud between the beginning of the leaf-vessels and the beginning of the root-vessels; the circulation resembling that of many insects, of fish and in the livers of quadrupeds, as shewn in Sect. V. 2. Secondly, there is probably at the same place a conjunction of the absorbent vessels correspondent to the receptaculum chyli of animals. Thirdly, there exists in each bud an organ of reproduction, which in a leaf-bud produces the lateral or paternal offspring, and in a flower-bud the seminal or amatorial one. Fourthly, a centre or nervous influence, as a brain, or spinal marrow, or common sensorium, exists in each bud; and probably resides near this junction of the blood-vessels of the leaf and root, and of the absorbent system, along with the organ of reproduction in the caudex gemmæ.

PROCEEDINGS OF THE *Massachusetts Agricultural Society,* Relative to the rates of duty in the Tariff, lately proposed to Congress.

At a meeting of the Board of Trustees of the Massachusetts society for promoting Agriculture, held at the hall of the Union Bank, September 11th, 1820.

It having been represented to this Board by various persons connected with Agriculture, that the rates of duty in the Tariff lately proposed to Congress and which will probably be renewed at the next session, will so materially and injuriously affect the interests of Agriculture, that it is the duty of this board to take the same into consideration, and to invite the attention of the Agricultural interest of Massachusetts to the subject; and this Board, desirous to ascertain the opinion of the various representatives and friends of Agriculture, throughout the Commonwealth, and to unite with them in such measures as they may mutually deem wise to be adopted, in relation to the said tariff—*Thereupon voted;* that the Corresponding Secretary be a Committee to address letters to the various Agricultural Societies within the Commonwealth, stating the general views of this board in relation to the effect of the proposed tariff, and requesting, that they would, if they concur therein, adopt such measures and make such suggestions to this board, as they may deem expedient, to prevent, as far as the just agricultural influence of Massachusetts extends, the passing of any tariff which has a tendency farther to distress the agriculture of the United States. Uniformly voted.

Extract from the Records.

BENJAMIN GUILD,
Assistant Rec. Sec. of the Massachusetts Society for Promotion of Agriculture,
September 11th, 1820.

ROXBURY, Sept. 12. 1820.

SIR—By the inclosed vote of the Trustees of the Massachusetts Society for promoting Agriculture, you will perceive that it was made my duty, not only to transmit the vote itself, but to subjoin the considerations and arguments, which had induced the Trustees to request your serious attention to the subject therein referred to. It is not the wish of that Board to interfere with any measures of the National Go-

vernment, except so far as they may be supposed to affect materially the interests of Agriculture. If the question had been confined simply to the respective concerns of Commerce and Manufactures, they certainly should have deemed it their duty to permit the parties who are immediately interested to contest the question between themselves and respectively to urge upon the National Government, the arguments and considerations which they might deem best adapted to promote their own views. The Massachusetts Agricultural Society have uniformly held the opinion, that the interests of Agriculture, Commerce, and Manufactures were inseparably united. They still adhere to the same sentiment. As a consequence of this opinion, they have always deemed it unwise and impolitic in the advocates of either of those branches of industry, to endeavour to obtain any peculiar and still less, any *exclusive* privileges, either by bounties, protecting duties, or by any other means in the power of the Government to use or grant, to the manifest disadvantage of the others. The only healthful growth, which either of them can expect to enjoy unmolested for any great length of time must be that which shall be produced by an equal, liberal, and just encouragement of them all. That the Trustees of the Massachusetts Agricultural Society have always been friendly to the growth and prosperity of the infant manufactures of our nation, is demonstrated by the fact, that unsolicited by any person connected with manufactures, they applied to the legislature of this State for a grant, to enable them to award premiums to those who should appear to have excelled in any of the manufacturing arts; and they have annually applied a fair and full share of their premiums and time, in promoting and recommending to public patronage and favor, various branches of our manufactures. They may therefore fairly claim for themselves the character of impartiality; and if, in the remarks which follow, there may appear to exist an opposition to certain new, and as it is feared, impolitic demands, impolitic even for the manufacturers themselves, it is presumed, or at least hoped, that it will be attributed to a serious apprehension, that the public, mutual, and general interests of the three great classes of society, will suffer from their adoption.

It is well known, that the *Agricultural* part of the American people constitute, as nearly as can be ascertained eight millions and a half of the whole population estimated (as it is presumed it will prove to be by the present Census,) at ten millions. Their scattered situation, the few opportunities they enjoy of exchanging opinions, the great difficulty of combination in consequence of these disadvantages render it very easy for the merchants and manufacturers, who are always in motion, and in correspondence, who have capital, and every facility in combining their efforts to produce a temporary, and, in some cases, a permanent effect on public opinion, and especially on our rulers which the quiet cultivators of the soil cannot check or control.

From this cause have resulted all the restrictive laws of great Britain, France, and of many other European States. But it is a singular fact, that these nations are all of them opening their eyes to their folly, and the ruinous effects, of the series of restrictive regulations which have cramped their Agriculture, and are making strenuous efforts to get rid of them; while we, with this example before us, are urged to enter into the same course of policy.

We have said that it has been supposed to be against the interests of the manufacturers themselves, to carry their point—to obtain a momentary triumph over Agriculture and Commerce—and on this ground, that, as it is probable all the European nations will speedily abandon this restrictive system, and as our country is so alive to its interests, and so readily, generally to discern them, it will not be possible long to support an erroneous system; it is, therefore as impolitic as it is unjust, to attempt to procure, at the expense of Agriculture, a temporary and artificial support. The Farmers will soon perceive, from the enhanced prices of every thing which they consume, and the diminished value of every thing which they raise, that they have been overlooked or betrayed. They will soon express that opinion in a voice too audible to be despised, and the repeal of all the protecting duties will plunge the manufacturers in deep and irrevocable ruin.

We have said, that it is very difficult for the farmers to collect together and exchange opinions. They are sound and wise in respect to their interests, when those interests are laid open to them; but they have not the means of mutual communication—they have nothing like "Chambers of Commerce"—or the *organised, active, persevering associations and incorporations of manufacturers*. Agriculture has no organs except the few Agricultural Societies. And should they be silent, if they sincerely believe that agriculture is in danger? That her chains are forging though not yet applied to her feet and hand?

The foregoing remarks, it is presumed, will be deemed a sufficient apology for calling your attention to the subject. We do not presume to anticipate your decision; we simply invite you to weigh the arguments adduced. It is, however, but a small part of them that your limits will permit us to urge; we mean the limits of respect for you, convinced as we are, that your own good sense will suggest many more powerful ones.

It is obvious, (so at least many persons believe) that we can never expect to sell our own surplus productions in foreign countries, if we refuse to consume those productions of other nations, which they can raise cheaper than we can. And the whole history of modern nations, since commerce has been well understood, and the principles of it settled, proves, that the wealth and prosperity of nations depend chiefly on the facility, with which what is raised in one country of any commodity, more than it needs, is exchanged for the produce of another. This it is which constitutes *commerce;* and this alone it is, which enables any country to raise one particle of any commodity more than its necessities require. This important truth is made very manifest, by referring to the case of an individual farmer. If he never sell that part of his produce which exceeded his own wants—he would have no inducement to raise it—his cultivation would be reduced to the smallest amount which his own family could consume—and where would be the surplus left for the payment of his taxes, for the amelioration and improvement of his estate, and for the provision of his numerous family? The same thing is true as to whole communities, and the farmer is as much interested in having a free export to foreign countries, and a ready demand there, for his productions, as the merchant is. The merchant, in fact, is only his carrier or factor. Check commerce, and the prices of all domestic articles fall. If the price of Butter falls in the Havana or in Charleston, it is felt as soon as known, in Worcester and in Berkshire.

But it is said, that by encouraging manufactures at home by extravagant protecting bounties,—we create a home market for what we raise—or in other words, that the mouths employed in factories, will consume all that the farmer can raise over his own wants. "We plant the consumer by the side of the manufacturer" Is the fashionable phrase. Were this even true, it would be better for the farmer to have two markets, instead of one. If the one market at home will afford him five dollars an hundred for his beef, the foreign market would add to this price, and enable him to get seven; or at least it would enable him to raise more.

But this is comparatively but a feeble part of the argument, though it is believed to be sound. Others it to be overlooked, that, if manufactures should be established and forced into an unnatural growth by means of a heavy tax on the rest of the community, it will take at least half a century, before capital will be so far diverted from other pursuits, and so much accumulated in manufactories, before the habits and employments of so *large a portion* of the community will be wholly changed, so as to furnish a home market for all the surplus of our own productions, which at present amount on an average to more than sixty millions of dollars. And if this be true, what in the mean time is to be the condition of the farmer, while the manufacturing system is *building up?* The manufacturers are now fed by the farmers. They raise enough for the consumption of every man and animal in the United States, and as much more as brings back into the country, either in money or in consumable productions of foreign countries, to the amount of fifty or sixty millions of dollars. Pass this law, and it is feared and believed by many considerate persons, that you put an end to your export trade—and for this reason, of which every farmer will feel the force; if we buy nothing of other nations, they cannot afford to buy of us. It is by what they sell to us, that they are enabled to purchase. If a farmer could sell neither his hay, or his his stock, or his butter, or his grain, how could he possibly afford to buy any articles which he did not raise himself? Even with the present export of fifty millions, it is perceived how much the prices of land, and of produce have fallen, owing in a very considerable degree to the existing high tariff or tax, laid in 1815 on the imported articles which we consume, and to the *apprehension* of the still greater one, that is threatened. What then must be the effect on the prices of land and produce, if all our export trade is either cut off or so cramped as to be abandoned as unprofitable? Is it not obvious, that as *many acres* will be thrown out of cultivation, as are now employed in raising fifty millions of dollars of our own produce, which we now export, after feeding ourselves and families, as well as the merchants and manufacturers? And if they are so thrown out of employment, will it not take a long period of years to reclaim them again from a state of wilderness, to bring them to a fertile condition?

Or will it be alleged, that the great spring given to to our own manufactures will soon increase the number of manufacturers to such a degree, as to take off as much surplus produce as we now export to other nations, and thus keep up the price of produce and lands? From what class, or what country, are these laborers to be drawn? If from our own country, they cannot be supplied for many years. Men must be created according to the laws of nature and as we now feed the ten millions of inhabitants in the United States, we do not see where those are to be found, for many years, who will consume what is now consumed in the West Indies and in Europe.

Or will it be *openly* avowed, that the new scheme of taxing agriculture and commerce will render them so unprofitable, as that the wages of labor will *fall* in those branches of industry, and thus compel the laborers to seek out the manufactories for employment and higher wages? The intelligent and honest advocates for this *forcing* system will add, "thus only the *poorest lands*, which now yield little profit, will be thrown out of employment, but the present value, and perhaps an higher one, will still continue for lands in the vicinity of the great manufacturing establishments." There is some truth (we admit) in this, but is it considered justifiable thus violently at once, by an act so unheard of in its extravagance, to change all the relations of property? To diminish the value of cultivated farms in *one* quarter of the country, or in the country at large, and to increase their value in particular spots? And for what great national good is all this evil to be endured, this injury inflicted on agriculture, this injustice and partiality manifested in our legislation? Is it because labor bestowed on manufactures is so much more profitable for the nation? Then it needs not its bounty and patronage. Or is it because the situation of the actual laborer in any manufacture is more independent, or that the employment is more healthful, better adapted to our system of government, better suited to the preservation of moral purity, than the cultivation of the land? Is it or is it not true, reasoning without the aid of the dreadful experiments which have been made in Europe, that a sedentary confined life is generally esteemed unhealthy? That the collection of three or four hundred persons in one or two edifices, together with the artificial heat often necessary to the successful prosecution of some manufactures, has been deemed very injurious to health and as tending not only to shorten human life, but to embitter it while it lasts? Is it probable, that virtue is promoted by the daily intercourse of large numbers of inexperienced persons of both sexes, more than in the quiet and less tempting state of family life? It is not intended to urge these arguments as far as they may be pressed, nor to bring into the question the scenes, which have lately con

vulsed the greatest manufacturing country in the word. These ideas are only intimated, in order to induce the agricultural part of the community to consider, whether there are any reasons sufficiently powerful to induce us to change our existing habits, and to form others to which we have as yet been strangers? In this view it may further be asked, what *proportion* of the community will be benefitted even by a *successful* cultivation of manufactures on an extensive scale? To prosecute them with success great capital is required, and it would not be extravagant to say, that the owners of this capital, the men to whom the profits will go, will be to the laborers employed in them, in the ratio of one to one hundred. If then the government shall tax the whole community, so as to make them pay for an article which they consume from fifty to one hundred and fifty per cent. more than they would pay under a free and unrestricted trade, *who are the gainers?* Not the one hundred laborers, for competition will reduce their rate of wages, as it has in England to the lowest possible point at which they can be subsisted, and all the profits will go to the capitalist who employs them.

Hence, instead of 100 respectable citizens earning a decent and comfortable support with perfect independence, as in the agricultural system, you will have one very opulent individual, and one hundred dependent on his will, his interest, or his success.—When the manufacturing capitalist fails, the 100 laborers are thrown out of employment; or if he finds the markets against him, he dismisses fifty of them, and they are thrown on the wide world, or their friends, or the towns, for their support, until again called into employment by the interest or caprice of the manufacturing capitalist. Such at least is the picture, and the true picture, which Europe has exhibited; and have we any right to suppose that the same causes will not produce the same effects among us? If there are any such reasons to distinguish our case, we have not seen them urged.

It will be seen, that in this very imperfect picture of the effects which will be produced by a law, the avowed object of which is not *revenue*, but *bounty*, to one and that the smallest in point of numbers of the three great classes of industry, we have omitted many very important considerations which have a close and powerful connection with the question.

We have as yet only attempted to shew its direct bearings, and its immediate and more violent operations on the agricultural interests, by the reduction, of the price of its products; the consequent diminution of the value of land; the increase of its expenses, while its profits are lessening, by drawing off the laborers who would have been devoted to agriculture, and thus enhancing or raising the price of agricultural labor.

We have now to add, the still more ruinous increase of price in all the articles which the farmer consumes, and which heretofore he has derived from some of his valuable *customers, foreign nations*, but which he cannot profitably raise, or produce, or manufacture himself.

The farmer is, according to the new tariff or tax, like a candle lighted at both ends. His revenue or income will be lessened while his expenses will be increased. It is obvious and incontrovertible, that if our capitalists who prefer to invest their capital in machinery, and in the safe routine of home industry, supported by the bounty of the state, and encouraged at the expense of all the other classes of society, can afford the articles which they manufacture, at as cheap a rate as that, at which other nations can afford them, and send them to us, they do not need any further aid. And if we *now* pay them directly from 25 to 100 per cent. profit more than the same articles would cost us without any duty, is it reasonable we should do more? Is it not a most wasteful expenditure of *American labor?* If the same labor employed in agriculture and in commerce, which is its handmaid, would procure for us half as much again of these productions, as we are now obliged to pay to our own manufacturers, or procure what we need for half the money we now pay, is it not apparent that we as a *nation*, and especially that the farmers, are sufferers?

A farmer, who enjoys some ease of circumstances, is compelled to conform in some degree to the usages, fashions, habits of the age. He cannot endure to see his children less decently or tastefully clothed than those of his neighbor. If his daughters were forced by him to cloth themselves in homespun garments, such as were worn fifty years since, he would hear incessant complaints: Murmurs—even acts of disobedience would be occasionally witnessed. It may be said that *this economy should* be the policy of the farmer, and that he ought to repress this modern extravagance and luxury. Much is to be said on this question. Consumption and an improved style of living are incentives to exertions; they indicate an improved state of society. The more our comforts and innocent indulgences are extended, (in all cases, however, limited to our means,) the greater will be the industry, the more rapid the progress of a nation in wealth and prosperity. Besides, it is not in the power either of rulers or individuals to effect much in the general habits or usages of society. Poverty, the absolute inability to procure these comforts, is the only check, and it is one which very few of us would be eager to see in operation. While therefore manners and usages continue as they are, and as our very unexampled success has made them, our farmers' daughters must have their calico or chintz, or even silk gowns, for dress occasions at least. By the *existing* taxes they pay on some of them one hundred per cent. duty—and they are now called upon to pay from 30 to 50 per cent more.

Of necessity the farmer is obliged to sell as much more corn and pork, to procure these articles, than if the trade was free. This is only one part of his burdens. Just in proportion as the foreign article is excluded by extravagant duties in favor of the home manufacturer, in the same ratio are our exports diminished, and the price of our own products reduced. So that he not only has to pay to a capitalist of his own country a double price for a given article, to that at which he could have obtained it without any protecting bounty to manufacturers, but he is compelled to sell double the amount of his own produce to procure it. Thus, in effect, he gives three days labor to procure that for which one would have sufficed. This is apparently unreasonable; and though the farmer is like Issachar, destined to bear eventually all the burdens of the state, it seems to be unreasonable thus to overload him.

Mark the contrast. While this system operates thus severely on the cultivator of the soil, who by his labor puts *every loom* in motion, and by his industry, sends *every ship* to sea, the reverse is the effect of this proposed law for new duties, on his neighbor in the manufacturing line. While he gains double what he would have gained on his ginghams, his sheeting, his calicoes, if there had been no duties, he buys the farmer's produce to feed his laborers, at half the price he could have bought it for had the trade been entirely free. Is this just? Will it long endure, even if adopted? Can the farmers be long insensible to the ruinous effects of these laws?

Shall it be said, that *even with these encouragements*, the manufacturers are still starving? Shall we look round about us and see their stock at 50 per cent loss, and not pity them? Why do you speak about profits of manufactories, when men, we know, are ruined by them? My answer is, that if this be the fact, it proves only the improvidence, want of skill, want of capital of those who are embarked in them. It shows also clearly that we began too early, and are pressing on too fast. To buy cheap and sell dear, is a rule that every farmer knows is necessary to success in private life. Why is it not as true as to communities?

These various considerations could be extended, urged, and enforced, far beyond what I have been able to do. It might be shewn, that for every thing the farmer consumes, he pays a tribute far beyond what is necessary for the national revenue. That he is in fact supporting by bounties, many of the manufacturers of his country.

I shall conclude with an important remark.—This system, of which we now doubt the justice and policy, is, we have reason to believe, brought forward against the opinion of the executive government of the United States. Mr Crawford, secretary of the treasury, we know made a report to Congress highly adverse to it, in which he intimated that its tendency would be to *lessen the revenue*. Yes; to lessen the revenue, while it *increased* the tax!! A strange idea at first blush, but perfectly true. It will lessen the revenue by diminishing importations, and of course, as we have endeavored to shew, by *lessening our exports of our own produce*. It will lessen it also by increasing the excitements to smuggling, to cheat the revenue; thus at once diminishing its receipts while it injures the morals of the people, and enfeebles the powers of government. He intimated, moreover, that by the diminution of revenue, direct taxes would become necessary; taxes on houses, lands, horses, carriages, and the various other objects formerly subjected to such burdens—taxes naturally disagreeable to our citizens, and very expensive in their collection. Thus, while the farmer is to sell cheaper, and to suffer in the fall of his estate, to pay more for what he consumes; for his iron, steel, hardware, sheetings, shirtings, fine woollens, and fine cotton goods, he may be subjected to a direct tax on his real and personal estate, at the moment when he is less able to meet them. The revenue of the government last year was incompetent to its wants, and a loan of three millions was made to meet the current expenses. This is a fact which cannot deceive us.

After all, sir, it is my duty to add, that although I could have extended these remarks far beyond what I have done, yet I am not certain that I have expressed correctly the views of the Trustees of our Society. I may have pressed some of the arguments farther than they would approve. I may have omitted many important ones that would have been suggested by them. It fell to my lot to perform this duty not because I was in any degree as well fitted for the task as others of that board, but because by their favour I was in a situation, which rendered it proper that the duty should devolve on me.

I am happy however in the reflection, that in the various societies to whom this letter will be sent, there will be found men capable of treating the subject with more profoundness, more closeness of argument, and a greater power of persuasion than I have been able to do.

I have the honor to be sir, very respectfully, your humble servant,

JOHN LOWELL.

Corresponding Secretary of the Massachusetts Agricultural Society

REMARKS ON THE COMMUNICATION OF *G. W.*, ATTRIBUTING GREAT EFFECTS TO THE INFLUENCE OF ASHES AND PLASTER, APPLIED TO INDIAN CORN PLANTED IN POOR LAND.

Mr. Skinner,

It is the misfortune of our art to be involved in much doubt, and when some of these doubts are by *many years experience* removed to our own satisfaction, we often have it not in our power to satisfy others, for the opinions of experienced men are often in contradiction and go generally no further than those of mere theorists as there is no mode of demonstrating them that is not liable to error. If we state to you the amount per acre of crop, or prove by shewing it; still there is no proof that its great size is the entire effect of the cause that we may be disposed to ascribe for it. There are many things that operate to promote or injure the growth of plants, and some of them very occult, which cannot be taken into the account at one, or even *two* experiments. Indeed in one season we will see a crop grow as it were by magic most luxuriantly; the next come to nothing and under the same management, yet we are unable to detect any very important differ-

ence in the weather. Without reference to this, and *other* things, one experiment generally satisfies *young* farmers; but it requires many to satisfy old ones, and then they receive conviction with caution at last. These reflections occured upon reading in your Farmer, No. 39 vol. 3, a communication signed *G. W.* on the cultivation of Indian Corn, wherein he states, that a handfull of ashes and plaster of paris, *covered* in each hill with the Corn, occasioned an increase of 100 per cent. in the crop; and believing it our mutual duty to communicate experiments when the results have differed, I take the liberty of remarking upon that communication, and offering mine on the same subjects.

It will be noted in the first place that Mr. G. W. gave his land a ploughing as deep as he could plough it—This may account for his extraordinary crop at least the *first* year, without the aid of ashes or plaster.

In the next place that he left no part of the ground undressed with ashes to observe the difference.

I cannot believe that the combination of ashes with plaster brings into operation any additional powers of either, which is not possessed, when used alone. Therefore there is no particular utility derivable from uniting them.

Having found that two bushels, of plaster on my clover, produces as much effect for the present year, as a greater quantity, I have been in the habit for many years of mixing one bushel of *damp* ashes to each two bushels of plaster, when sowing it, to prevent its flying; and I made repeated experiments to see if the addition of the ashes made any visible difference, but never perceived any. It did no doubt benefit the corps but in so small a degree as not to be perceptible. The ashes are valuable to moisten the plaster, and I stated my practice to Doctor Harris, of your city, some years ago, who had then a Farm in the county, and who was much pleased with the suggestion. It was practised in Pennsylvania 15 years ago, and I was surprised it had not found its way into Baltimore county. Damping the plaster without the ashes makes it cohere, and with ashes you may sow in windy wather.

I also made repeated experiments on the grass walks in the garden, where I put on as much as 50 and 100 bushels to the acre of ashes, and could not perceive that the union of plaster with ashes gave additional powers to the one or the other. Two bushels of plaster to the acre produced *nearly* as much effect the first summer, as when combined with the ashes: but the ashes last for years, while the land when kept closely mowed after plaster soon becomes exhausted, without the application of other manure.

Soap Boiler's ashes are, I take it, the poorest of all, as they leach them so severely, and my experiments on Corn have convinced me that half a shovel full in the Corn hills at five feet apart is the least that should be used, if you wish to put on as much of that manure as the land in my opinion ought to have—this is about five good cart loads to the acre, and it will double the crop, I believe on any land rich or poor that has not *already ashes enough* on it.

I have applied it under the corn, on the corn exactly on the hill above, and spread circularly round the top of the hill, which is easily done with an expert hand at the shovel—this I have found the best manner decidedly of applying all kinds of manure for the hill. The first rains send it down about the roots of the young corn then circumscribed, and the different workings afterwards with the harrow and hoe, scatter it through the soil.

If experience did not, reason I think ought to teach us, that the manure should be so applied that it will during the growth of the crop be spread all though the ground.

The roots of the corn at five feet distance run from hill to hill, and strike deep into the ground, and of course the more the manure is divided the better can these roots take it up.—The ashes must be in contact with and divided by the earth to act to the greatest advantage; for we know, that corn will not grow in a bank of ashes.

Besides, without this scattering, if put in wheat, the land will exhibit a very awkward and irregular appearance, a high tuft of wheat at every corn hill. My plan completely remedies these objections, while it embraces the advantages of manuring in the hill (which though it is by many considered a peddling mode of manuring) rely upon it, is the mode to apply scanty rescources.

Plaster acts on the grasses on my land, and I have repeatedly tried it on corn in various quantities, and modes; but I have not seen effects at any time, sufficient to induce me to think it worth the trouble of applying.

I am persuaded that no quantity of plaster that could be applied would increase the crop 25 per cent; and I think I have made experiments enough with ashes to know, that a handful to each hill would not increase the crop 25 per cent. If therefore I am right, Mr. G. W's success must have proceeded from his deep ploughing or some other cause; and not alone from the application of his 10 dollars worth of manure.

ENQUIRER.

December 21st, 1821.

CATTLE SHOW &c.

Worcester Co. Mass. Wednesday, October 3, 1821.

On Thursday last, the WORCESTER COUNTY AGRICULTURAL SOCIETY held their *third Anniversary cattle show, ploughing match, and exhibition of manufactures.* We congratulate the members of the Society and the farmers of the county of Worcester upon the success which has again crowned their exertions. We speak but the sober truth in saying, that *every* pledge has been redeemed, *every* promise fulfilled, *every* reasonable expectation gratified. With a pride which is warranted by so good a cause and so honorable a result, we *now* repeat the question—"Where is the individual who doubts that the tendency of this institution is as beneficial as its purposes are pure and patriotic?"

The ploughmen drew for lots, and precisely at 9 o'clock the teams started together in the match. A subsequent sketch of the committee's report will shew in what manner the work was performed.

At 11 o'clock the Society moved in procession to the South Meeting House. The public services were introduced by a Prayer from the *Rev. Dr. Thayer*, of Lancaster, which was not only peculiarly appropriate to the occasion, but one of the most truly eloquent thanksgivings to the Great Creator, to which we ever listened. An address was pronounced by the hon. JONATHAN RUSSELL, of Mendon, one of the vice-presidents of the Society. We will not attempt a sketch of this excellent preformance. It will probably soon be laid before the public; and we doubt not they will confirm the judgment of a numerous and highly respectable audience, who have given to the address what we consider very high praise, by pronouncing it in every respect, worthy of its author. After the services were concluded, the names of the various committees were announced; and the procession being formed in the same order in which it entered the house, made a circuit of the pens to view the animals which they enclosed, and was dismissed in the area between the pens. The committees then proceeded to a discharge of their arduous duties. At half past 2 o'clock, a procession was again formed for dinner, which was provided in a very handsome manner by Messrs. *Howe, and White*, at their hotel. *Hon. Daniel Waldo* presided, assisted by *Stephen Williams, esq.* one of the vice-presidents of the Society. After dinner the following toasts were announced:—

Our Mother Earth—It becomes her offspring to reflect, that like *other* mothers, the *nutriment* she affords is dependent on the *aliment* she receives.

"In government as in religion, having much freedom, let us not forget all restraint."

The Nobility of our Country.—The LORDS *of the Soil.*

The *Plough*, *Shuttle* and *Canvass*—They furnish our three prime comforts—*Food, Clothing, Cash.*

The Ploughing Match, and all *other matches*, which will test the ability of *each* member of our Society to perform his business in a *husband like* manner

The Farmer's *Cardinal points*—Good Tools, Strong Teams, Neat Farms, '*Smart Wives.*"

"*My Jolly Boys now who follow the Plough.*"

Drink—"*Long life and success to the* FARMER"

At 5 o'clock the Trustees assembled in the Meeting-House, and the several committees made their reports, of which only a summary sketch can now be given. It is intended to publish them hereafter in detail.

The committee on *Neat Stock and Swine* consisted of hon. Levi Lincoln, of Worcester, chairman; col. William Eager, of Northborough, Joseph Estabrook, esq. of Royalston, Stephen Hastings, esq. of Sterling, and col. William Foster, of Sturbridge. The report of this committee was highly interesting, and will be published at length in the course of a week or two. The chairman introduced his report by observing, that the time allowed them for the examination of more than 150 animals, was shorter than they could have wished, but they had exercised their best judgment, and if they could not satisfy all, they hoped for a candid interpretation of their motives, and of the rules by which they had endeavoured impartially to govern themselves. The committee then proceeded to notice those fine animals which were exhibited of the *Tees-water breed* recently introduced into the country by Mr William's imported Bull "*Denton.*" They passed a high commendation upon this noble breed, and observed, that so far from degenerating in this country, it seemed to be improved by crossing with our common breed.* Among the young creatures of this stock, the committee particularly noticed the following.—A Bull, 1 year and 5 months old, of Messrs. Penniman and Ranger, of New Braintree; a Bull of Mr. Cleaveland, of Lancaster; a Bull Calf of Mr. Henry Bullard, of Holden, 6 months old; a Bull Calf of John W. Hubbard, esq. of Worcester, 10 months old, and another 6 months and 13 days old; a Bull Calf of capt. Samuel Ward, of Worcester, of the same age to a day with the last mentioned calf of Mr. Hubbard; a Heifer of hon. Nathaniel Paine, of Worcester, 1 year and 14 days old, and already with Calf by Mr Hubbard's oldest Bull Calf; three Heifer Calves of the chairman of the committee, Mr Lincoln, 6 months old; two Heifers with their Calves, belonging to John Hare Powell, esq. of Pennsylvania, an enterprizing and scientifick Agriculturist, who lately purchased these animals of Mr. Williams, and suffered them to be offered at our show for exhibition merely; and four Yearling Heifers of Mr. Williams. The committee

also mentioned with approbation the fine stock of Mr. Asa Rice, jun. of Shrewsbury, among which was a Heifer of the same breed. The committee recommended the following premiums:—

To Payson Williams, of Fitchburg for the best Bull, not less than one year old, $10 00
To John Richardson, of Templeton, for the next best Bull, 7 00
To Henry Bullard, of Holden, for the best Bull Calf, 5 00
To Samuel Ward, of Worcester, for the next best, 3 00
To Nathaniel Paine, of Worcester, for the best Milch Cow, 10 00
To Horace Warren, of New-Braintree, for the next best, 7 00
To John W. Hubbard, of Worcester, for the next best, 5 00
To Job Rainger, of New-Braintree, for a very excellent Cow, 5 00
To Nathaniel Paine, of Worcester, for the best Heifer, from 1 to 3 years old, with or without Calf, 5 00
To Lewis Barnard, of Worcester, for the next best, 3 00
To Daniel King, of Rutland, for the best Heifer Calf, from 4 to 12 months old, 4 00
To Lovet Peters, of Westborough, for the next best, 2 00
To Asa Rice, jun. of Shrewsbury, for the best Ox, fatted for slaughter, regard being had to the mode and expense of fatting, (wt. 2128 lbs) 4 years old, 10 00
To Stephen Howe, of Petersham, for the next best Ox, (wt. 2545 lbs.) 8 years old, 7 00
To Lewis Barnard, of Worcester, for the next best Ox, (wt. 2215lbs.) 5 years old. 5 00
To Seth Wyman, of Shrewsbury, for the best pair of 4 year old Steers, broken to the yoke, and kept for labour. 10 00
To Jonathan Davis, jun. of Oxford, for the best pair of 3 years old Steers, broken to the yoke, 8 00
To Thomas W. Ward, of Shrewsbury, for the best Steers, from 1 to 3 years old past, broken or unbroken, 7 00
To Nathaniel Dodge, of Sutton, for the next best, 5 00
To Luther Whiting, of Sutton, for the next best, 3 00
To Jonathan Davis, jun. of Oxford, for the best Boar, not more than 2 years nor less than 6 months old, 5 00
To Jacob Hinds, of West-Boylston, for the next best, 3 00
To David Lovell, of Worcester, for the best breeding Sow, 3 00
To David Lovell, for the best weaned Pigs, not less than 3 in number, of the same litter, 3 00

In consideration of the attention paid to the Society by Mr Powell, of Philadelphia, and the singular excellency of the stock exhibited by him, particularly of his two years old Heifer, with her two Calves, the Committee recommended that the Trustees present to him a premium plate for that animal

The Committee noticed many other fine animals, on whose owners it was impossible to bestow any pecuniary reward, from the limited number of premiums. They also noticed the beautiful stock sent for exhibition merely, by Ward Nicholas Boylston, Esq of Princeton. All these particulars will appear in the Report of the Committee, which will be published at length.

The Committee on *Working Oxen* recommend the following premiums:—

To Darius Putnam, of Sutton, the 1st premium $15 00
To Silas Dudley, of Sutton the 2d do. 10 00
To Salmon Hathaway, of Grafton, 3d do. 8 00
To Jonas L. Sibley, of Sutton, the 4th do. 6 00
To Lewis Lilley, of Oxford, the 5th do 5 00

The Committee on *Merino, Mixed, and Native Sheep* recommended the following premiums:—

To William Lincoln, of Worcester, for the best Merino Ram, $7 00
To James Smith, of Rutland, for the next best, 5 00
To William Lincoln, of Worcester, for the best lot of Merino Ewes, not less than 4 in number, 10 00
To James Smith, 2d, of Rutland, for the next best, 5 00
To Benjamin Holden, of Rutland, for the best Native Ram, 3 00
To John Peirce, of Milbury, for the next best, 2 00
To Stephen Howe, of Petersham, for the best Native Ewes, 6 00
To Elisha Matthews, of New Braintree, for the best lot of Mixed Ewes, 5 00

The Committee observed, that a premium would have been given to the excellent Native Ram of John Stratton, of Philipston, had it been regularly entered. It appears since, that a mere accident, and not any negligence of the owner, prevented a seasonable entry of this animal; and we have no doubt the Trustees, taking this into consideration, will adjudge the owner a premium.

The Committee on the Ploughing Match reported, that the field which had been surveyed into lots for the purpose, had been laid down to grass for more than twenty-five years. The soil was loam mixed with gravel. The work was performed in the respective lots as follows:—

Lot No. 1. Jonas L. Sibley, of Sutton, one yoke of Oxen: his ploughman, Samuel Sibley; driver, Jeremiah Richardson; plough made by Abner Chase, of Sutton; work done in 19 *min.*

No. 2. Lewis Lilly, of Oxford, one yoke of Oxen; himself ploughman; no driver; plough made by A. Chase, 2½ *min.*

No. 3. Levi Lincoln, of Worcester, two yokes of Oxen; ploughman, Philemon Wright; driver, Artemas Ward; Wood's patent plough, 20 *min.*

No. 4. Salmon Hathaway, of Grafton; one yoke of Oxen; himself ploughman; driver, Asa Cummings; plough made by John Hall, of Sutton, with a wheel 9 *min.*

No. 5. Darius Putnam, of Sutton; one yoke of Oxen; ploughman, David Putnam; himself driver; plough with a wheel made by Nathaniel Sibley of Sutton 17 *min.*

No. 6. Nathaniel Gates, of Worcester; one yoke of Oxen; himself ploughman; driver, Levi Gates; Wood's patent plough, 30 *min*

No. 7 Luke Aldrich, jun. of Mendon; two yokes of Oxen; himself ploughman; driver, William Trask, a boy; plough with a cutter, made by Jesse Warren, of Dedham, 2½ *min*

No. 8 Israel Whitney, of Worcester; one yoke of Oxen; himself ploughman; no driver, 19 *min*

No 9. Silas Dudley, of Sutton; one yoke of Oxen; himself ploughman; no driver; common plough, 25 *min*

The test of merit was the best work with the least expense of labour. The Committee remarked, that it was very difficult to decide among competitors when all did so well; but in the best exercise of their judgment they had concluded to recommend the following premiums:—

To Silas Dudley the *first premium* of Ten Dollars; and also a premium to himself, as ploughman and driver, of Eight Dollars

To Jonas L. Sibley, the *second premium*, of Eight Dollars for the plough; to his ploughman, Four Dollars; and to his Driver, Two Dollars.

To Lewis Lilly, the *third premium* of Six Dollars for the plough; and Four Dollars to himself as ploughman and driver.

To Darius Putnam, the *fourth premium*, of Four Dollars for the plough; and to his ploughman Two Dollars.

To Luke Aldrich, jun. a premium of Four Dollars, for his excellent *work*, which was as good as any on the field.

The Reports of the respective Committees were accepted by the Trustees, and the premiums which had been recommended were awarded accordingly.

The Committee on *Agricultural Improvements and Experiments, and Original Inventions* consists of Hon. Oliver Fisk, of Worcester, Chairman; Hon. Stephen P. Gardner, of Bolton, Thomas W. Ward, of Shrewsbury, Hon. Benjamin Adams, of Uxbridge, and Lovett Peters, Esq. of Westborough. This Committee will report in December next and agricultural essays, claims for premiums, &c. may be transmitted to the Corresponding Secretary, postage paid, on or before the first of December.

The Committee of Arrangements, in behalf of the Society, returned thanks to the Hon. JONATHAN RUSSELL for his Address, and requested a copy to be placed at the disposal of the Trustees. Mr. Russell has very politely furnished a copy; and it will probably soon be laid before the public, accompanied with a summary statement of the proceedings of the day, and a corrected list of the members.

The Society was complimented by a delegation from the Agricultural Society of the County of Windham, State of Connecticut. This delegation consisted of Messrs. Perkins and Hall.

The thanks of the Society are due to many gentlemen for their active exertions and the powerful aid they have afforded on this occasion; they are particulary indebted to the gentlemen who consented to act as Marshals, who performed their duty with energy and discretion, viz.—Gen Thomas Chamberlain, Col. Samuel Mixter, jun. Col Cyrus Leland, Col. John W. Lincoln, and Major Seth Caldwell.

All the proceedings of the day were conducted and terminated in the most satisfactory manner. The farmers of the County of Worcester have reason to be proud of such a display of their resources and enterprize. It is in their own power to maintain and exalt their present high character. It will be their own fault if it is ever forfeited

RECIPES.

Original mode of curing Hams.

Put each ham with two tea-spoonsfull of salt petre, and let them remain for eight or ten hours, then mix brown sugar with fine salt, till the salt is brown, and then rub each ham well with this mixture, and pack them down in a tight cask, sprinkling salt very lightly over every layer, let them remain for twelve or fourteen days, then unpack them and put those that were on the top, at bottom, and any pickle which they made, pour over them, and in two weeks more they will be fit to smoke.

Common Salt and sifted wood ashes, in equal parts, made into a paste with water, make as good cement for iron flues, &c. better than most other compositions, and may be applied when the flue is not cold. Iron filings and vinegar will do as well.

OVERSEER.

Wants a situation as overseer, a married man who was brought up to farming in one of the first Agricultural counties in England, and has had some experience in this state. His wife would undertake the management of a small dairy. For information as to character and capacity a reference will be given to his late employer, a gentleman of the first respectability. Apply at Matthew Smith's, No. 228 Market street

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